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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/772,409

02/06/2004

Hideki Hashizume

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EXAMINER

STAHL, MICHAEL J

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 12/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/772,409

Applicant(s)

HASHIZUME ET AL.

Examiner

Mike Stahl

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 12 and 14 is/are rejected.
- 7) ☒ Claim(s) 4 and 8-16 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 June 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>6/18/04, 9/3/04</u> . | 6) <input type="checkbox"/> Other: ____. |

Claim Objections

Claim 4 is objected to because it should depend from claim 3 (“the optical filter brought into close contact” is mentioned in claim 3 but not in claim 2).

Claim 8 is objected to because the reference to “at least one of the output fibers” having an end face arranged at a position of coupling the focused flux of light (i.e., the light that passes through all the filters) is inconsistent with base claim 1. All the output fibers of claim 1 are arranged to receive light which is emitted by the first end face of the first lens. Any light that passes through all the filters would not be reflected back through the first end face of the first lens and therefore would not couple to any of the output fibers of claim 1. It is suggested that “at least one of the output optical fibers” should be replaced with “at least one further output optical fiber” to clarify that this fiber is not part of the set of fibers from claim 1. Similarly, in claim 11, “said at least one of the output optical fibers” should be replaced with “said at least one further output optical fiber”.

Claim 12 is objected to because at p. 44 line 18, “lease” should be changed to “least”.

Claim 15 is objected to because at p. 45 line 21 and p. 47 line 4, “fist” should be changed to “first”.

Claim 15 is further objected to because at p. 47 line 15, “the fifth” should be changed to “a fifth”.

Claims 9-11, 13-14, and 16 are objected to by virtue of their dependence from claims 8, 12, and 15 respectively.

Claim Rejections - 35 USC § 103

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7, 12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imoto et al. (US 4880289).

Claim 1: Referring to fig. 7, Imoto discloses a wavelength division multiplexing coupler comprising: an input optical fiber 7 for emitting a flux of light multiplexed with a plurality of wavelengths from an end face thereof; a lens 24 having a first face into which the flux of light emitted from the input optical fiber is input, and a second face from which the flux of light converted into a flux of parallel light is emitted; a first optical filter group comprising a plurality of optical filters 25a and 25b through which predetermined wavelength ranges of light are transmitted respectively aligned along a direction of advancing the flux of parallel light so as to

be fixed on a side of the second face of the lens **24** by angles θ_1 and θ_2 different from each other relative to an optical axis of the lens such that fluxes of light in predetermined wavelength ranges (including respectively λ_1 and λ_3) included in the flux of parallel light are reflected respectively in predetermined directions; and a set of output optical fibers **9** and **35**, end faces of which are arranged at positions at which fluxes of parallel light arranged by the respective optical filters of the first optical filter group are focused respectively by input into the second face and emitted from the first face of the lens. See the detailed explanation at col. 11 ln. 11 – col. 13 ln. 4.

In the fig. 7 embodiment, Imoto does not disclose the remaining claimed limitation of a second optical filter group for transmitting the predetermined wavelength ranges (i.e. λ_1 and λ_3), the second group being arranged between the first face of lens **24** and the respective end faces of output fibers **9** or **35** for coupling the fluxes of light reflected by the respective optical filters of the first optical filter group **25a/25b**. However, other embodiments of the invention include secondary filters for providing enhanced crosstalk attenuation. Note the filters **68/69** of the fig. 10D and fig. 11C embodiments (col. 15 lns. 5-17; col. 16 lns. 9-29). In particular, filter **68** of fig. 10D demonstrates that secondary filters can be used for isolating a received signal (λ_2 in that figure). Accordingly, it would have been obvious to a skilled person to have disposed secondary filters, which pass only λ_1 and λ_3 (respectively), between the first face of lens **24** and the end faces of fibers **9** and **35** in order to beneficially provide further isolation of λ_1 and λ_3 from each other and from any stray wavelength components (such as λ_2). The proposed modification would have met the requirements of claim 1.

Claims 2 and 7: Lens **24** is a gradient index rod lens (col. 1 lns. 55-60; col. 6 lns. 12-24) having a first end face corresponding to the first face and a second end face corresponding to the

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second face, and the input optical fiber and the set of the output optical fibers are held such that the optical axes thereof are mutually parallel (figs. 13A-14B). It is considered within the scope of the reference to use a holder similar to **70** with the fig. 7 embodiment.

Claims 3-4: The optical filter **25a** of the first filter group arranged at the side closest to the second end face of the lens is brought into close contact with the second end face of the lens. In particular, filter **25a** is a dielectric multilayer film which is directly formed on the second end face of the lens (col. 11 lns. 14-23; col. 6 lns. 18-28).

Claim 5: At least portions of the filters belonging to the second group are dielectric multilayer films, which are formed on the first end face of lens **24** (see the description at col. 15 lns. 5-10 in relation to filters **68/69**; a similar arrangement would have been used in the above-proposed modification).

Claim 6: Imoto does not describe forming the secondary filters (such as **68/69**) directly on the end faces of output fibers **9** and **35**. However, it would have been obvious to a skilled person at the time the present invention was made to have done it this way because it would be less complicated than putting the filters directly on the lens. In particular it would have been simpler to form the λ_1 filter on the end face of fiber **9** and the λ_3 filter on the end face of fiber **35**, then assemble the fiber ends near lens **24**, rather than having to use a masking process to form the λ_1 and λ_3 filters (which have different multilayer constitutions) on separate areas of the lens end face.

Claim 12: The fig. 7 device includes: an input optical fiber **7** for emitting a flux of light multiplexed with a plurality of wavelengths from an end face thereof; a first lens **24** having a first face into which the flux of light emitted from the input optical fiber is input and a second

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face from which the flux of light converted into a flux of parallel light is emitted; first, second, and third output optical fibers (33, 9, and 35), two of which (9 and 35) are provided in parallel with the input optical fiber for multiplexing / demultiplexing three wavelengths; a first optical filter 25a for transmitting fluxes of light having a first (λ_2) and a second (λ_1) wavelength and reflecting a flux of light having a third wavelength (λ_3) is directly formed at a second end face corresponding to the second end face of the first lens 24; a second optical filter 25b for transmitting the flux of light having the first wavelength (λ_2) and reflecting at least the flux of light having the second wavelength (λ_1), a light incident face of the second optical filter being fixed to the second end face of the first lens 24 brought into close contact with the first filter by angles different from each other relative to the optical axis of the first lens; a third output optical fiber 35 whose end face is arranged at a position at which the flux of the light having the third wavelength (λ_3) reflected by the first optical filter is focused via the first lens 24; an end face of the second output optical fiber 9 is arranged at a position at which the flux of light having the second wavelength (λ_1) reflected by the second optical filter is focused by the first lens via the first optical filter; and the end face of the first output optical fiber 33 is arranged at a position at which the flux of light having the first wavelength (λ_2) transmitted through the first and second optical filters is focused via a second lens 22.

What fig. 7 lacks with regard to claim 12 are the third and fourth optical filters which transmit the third and second wavelength (respectively) and reflect the other wavelengths, and which are formed on the first end face of the first lens 24 so as to oppose the end faces of the third and second output fibers. Imoto teaches the use of secondary filters, formed directly on the lens, for additional wavelength isolation as noted earlier in this action. It would have been

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obvious to a skilled person to have provided the recited third and fourth optical filters for the same reasons given above in relation to claim 1.

Claim 14: Imoto does not mention all the recited wavelength ranges. It is apparent that the Imoto apparatus could be adapted to an arbitrary set of wavelengths $\lambda_1 - \lambda_3$ based on the laser diodes used, by appropriately matching the various filters **25** to those wavelengths. Thus it would have been obvious to a skilled person to have picked any suitable wavelength ranges, including the recited ones which are already well known in the art and were in common use in optical networks at the time the present invention was made.

Allowable Subject Matter

Claims 8-11 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and if rewritten to overcome the above objections to claims 8 and 12 (p. 2 of this action). Claims 15 and 16 would be allowable if the above objection to claim 15 is overcome.

Claim 8 requires a second lens, having third and fourth faces such that light which passes the entire first filter group is input to the third face and output from the fourth face, and an additional output fiber positioned to receive the passed light. This arrangement is not disclosed or suggested by the applied Imoto reference. It is noted that although light at λ_2 passes through the first filter group **25a/25b** and is incident on one face of a second lens **22** (fig. 7), that light is not emitted from the other face of lens **22** into an additional output fiber. None of the other

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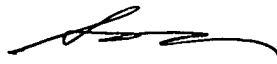
references of record disclose or suggest an optical coupler which meets all the limitations of claim 8. Claims 9-11 depend from claim 8.

As to claim 15, although the Imoto reference teaches that the apparatus can be expanded to process more wavelengths (col. 15 lns. 22-28), it does not teach or suggest the limitation of an optical filter chip arranged between end faces of first and second lenses which themselves have first and second optical filters. None of the other references of record disclose or suggest an optical coupler which meets all the limitations of claim 15. Claim 16 depends from claim 15.

Conclusion

The additional references listed on the attached PTO-892 form are considered relevant to this application. Inquiries about this letter should be directed to Mike Stahl at 571-272-2360. Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the technical support staff supervisor at 571-272-1626. Official communications which are eligible for submission by facsimile and which pertain to this application may be faxed to 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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December 2, 2005


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